

2-line IPAD™ EMI filter and ESD protection

Features

- 2-line symmetrical low-pass filter
- Lead-free package
- Very low PCB space consuming: < 1.5 mm²
- Very thin package: 0.65 mm
- High efficiency in ESD suppression
IEC 61000-4-2 level 4
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging

Complies with the following standards

- IEC 61000-4-2 level 4:
 - 15 kV (air discharge)
 - 8 kV (contact discharge)

Application

- Mobile phones (differential microphone filtering and ESD protection)

Description

The EMIF02-MIC06F3 is a highly integrated device designed to suppress EMI/RFI noise for dual microphone line filtering.

The EMIF02-MIC06F3 Flip-Chip packaging means the package size is equal to the die size. That's why EMIF02-MIC06F3 is a very small device.

Additionally, this filter includes an ESD protection circuitry which prevents damage to the application when subjected to ESD surges up to 15 kV.

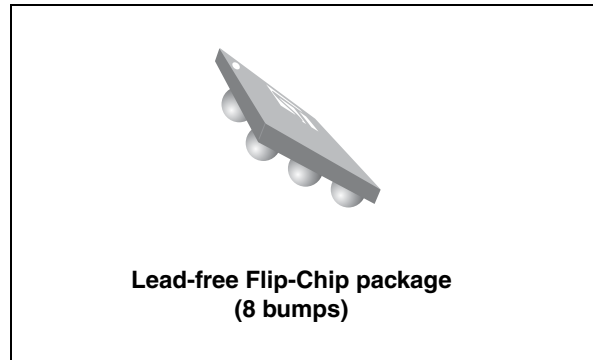
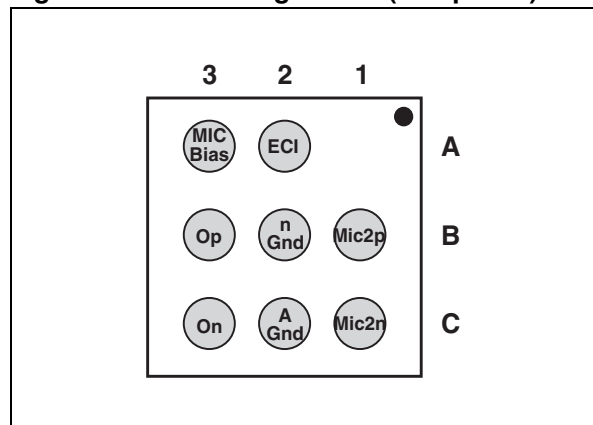


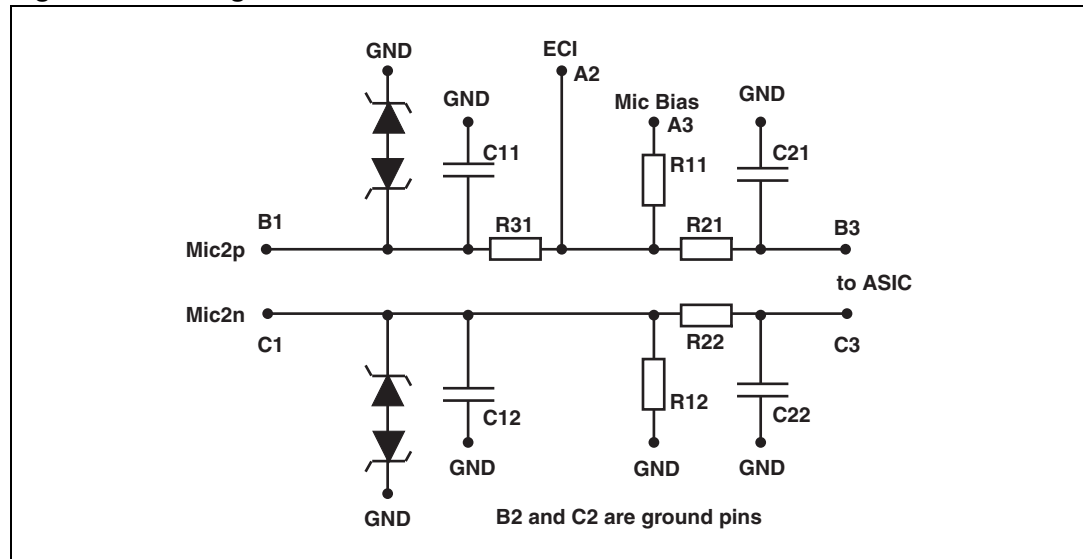
Figure 1. Pin configuration (bump side)



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1 Characteristics

Figure 2. Configuration



ECI pin connection

The ECI pin (enhancement control interface) is an input pin for the audio pre-amplifier chip which detects the voltage of the microphone line MIC2P in case the user presses the on-hook/off-hook button on the headset. When the user selects off-hook using the headset button, the MIC2P is shorted to MIC2N which is grounded. If your design does not support the ECI feature, the ECI pin must be left open (not connected).

Table 1. Absolute ratings (limiting values)

Symbol	Parameter and test conditions	Value	Unit
V_{PP}	Pins B1 and C1: ESD discharge IEC 61000-4-2, level 4 air discharge	15	kV
	contact discharge	8	
	Pins A2, A3, B2, B3, C2, C3: ESD discharge IEC 61000-4-2, level 1 air discharge	2	
	contact discharge	2	
P_D	Power dissipation at $T_{amb} = 25\text{ °C}$	60	mW
T_j	Maximum junction temperature	125	°C
T_{op}	Operating temperature range	- 40 to + 85	°C
T_{stg}	Storage temperature range	- 55 to + 150	°C

Figure 3. Electrical characteristics (definitions)

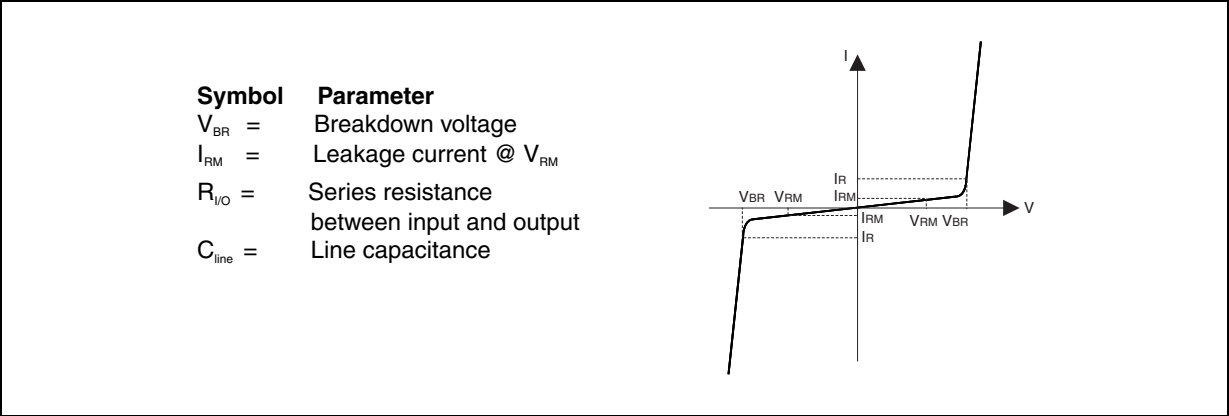


Table 2. Electrical characteristics - values ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	$I_R = 1\text{ mA}$	14			V
I_{RM}	$V_{RM} = 3\text{ V per line}$			100	nA
R_{11}		1.9	2	2.1	k Ω
R_{12}		0.8	1	1.2	k Ω
R_{21}, R_{22}		1.76	2.2	2.64	k Ω
R_{31}		20	25	30	Ω
C_{11}, C_{12}	$V_R = 0\text{ V}$		0.8	1	nF
C_{21}, C_{22}	$V_R = 0\text{ V}$	1	1.25		nF

Figure 4. Attenuation simulation with 1 k Ω input and 10 k Ω output

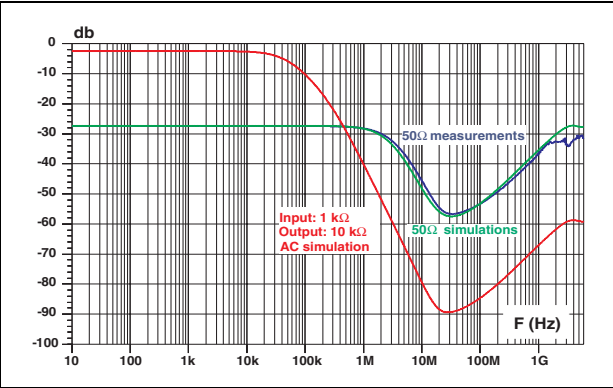


Figure 5. Analog crosstalk measurement

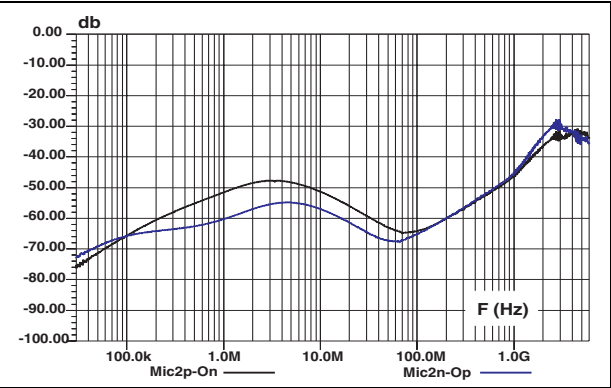


Figure 6. ESD response to IEC 61000-4-2 (+15 kV air discharge) on Mic2p

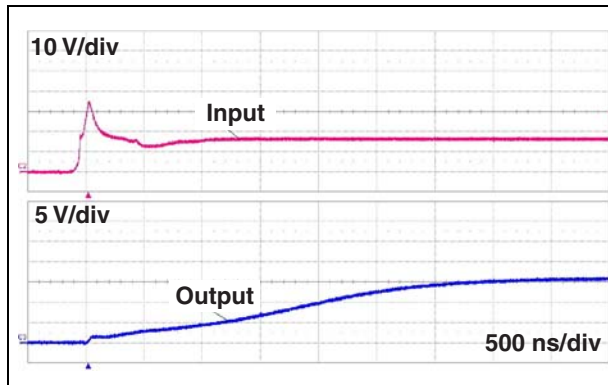


Figure 7. ESD response to IEC 61000-4-2 (-15 kV air discharge) on Mic2p

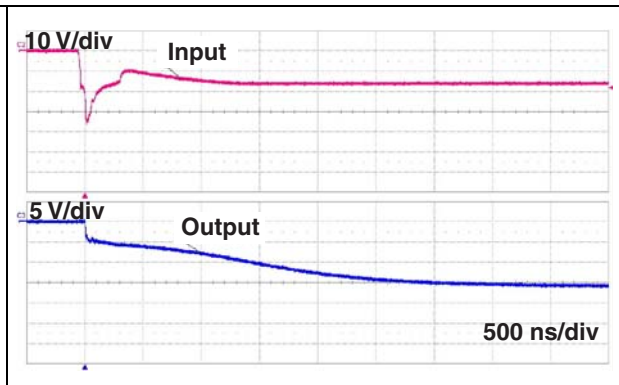


Figure 8. ESD response to IEC 61000-4-2 (+15 kV air discharge) on Mic2n

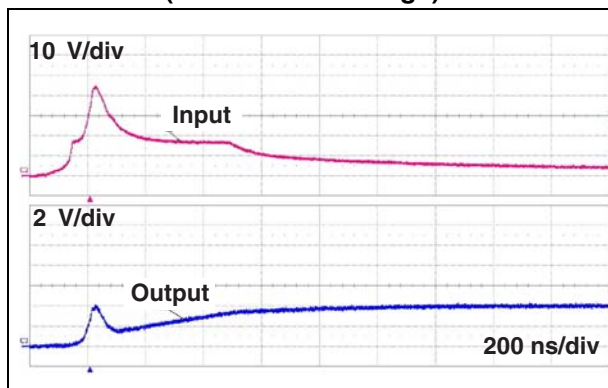


Figure 9. ESD response to IEC 61000-4-2 (-15 kV air discharge) on Mic2n

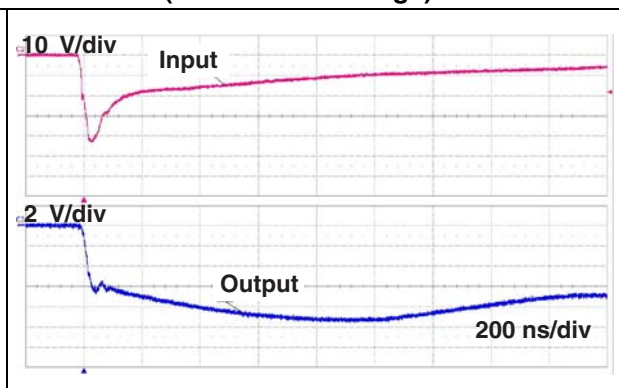
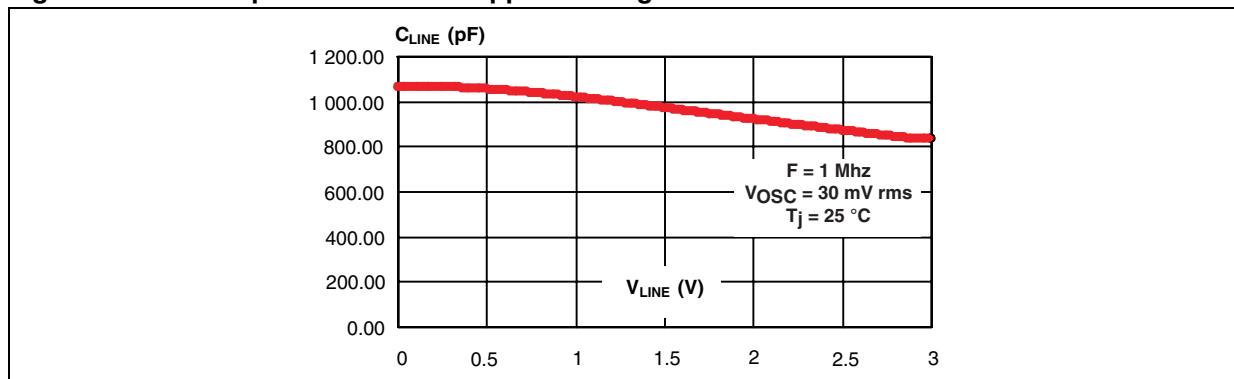
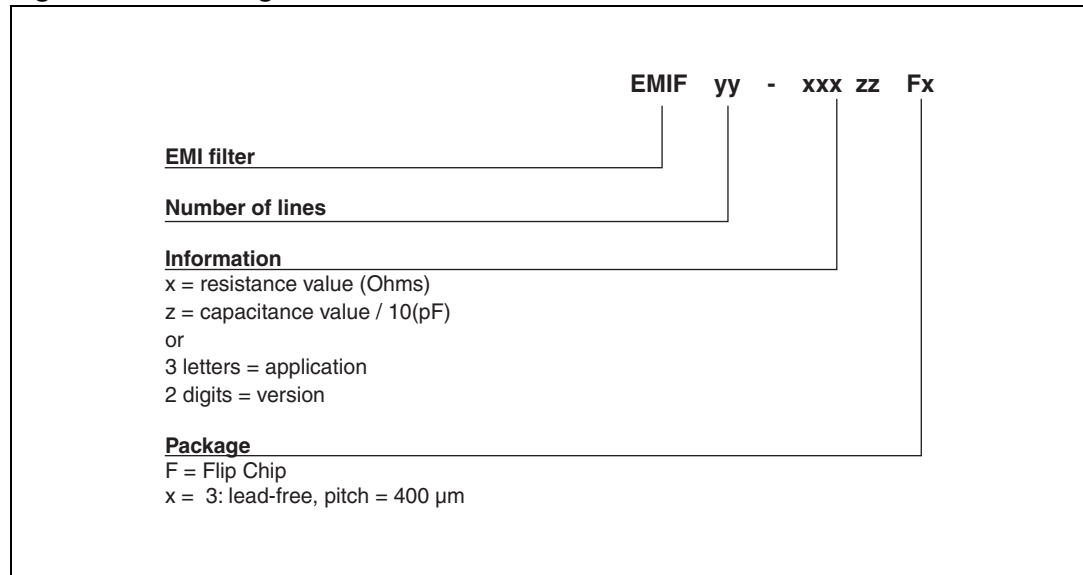


Figure 10. Line capacitance versus applied voltage



2 Ordering information scheme

Figure 11. Ordering information scheme



3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

Figure 12. Flip Chip package dimensions

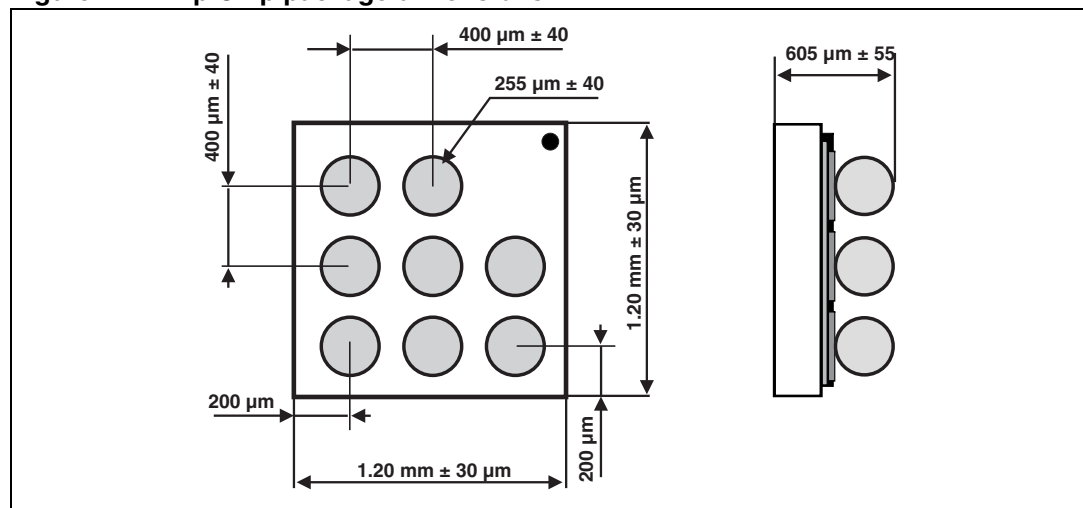


Figure 13. Footprint recommendations Figure 14. Marking

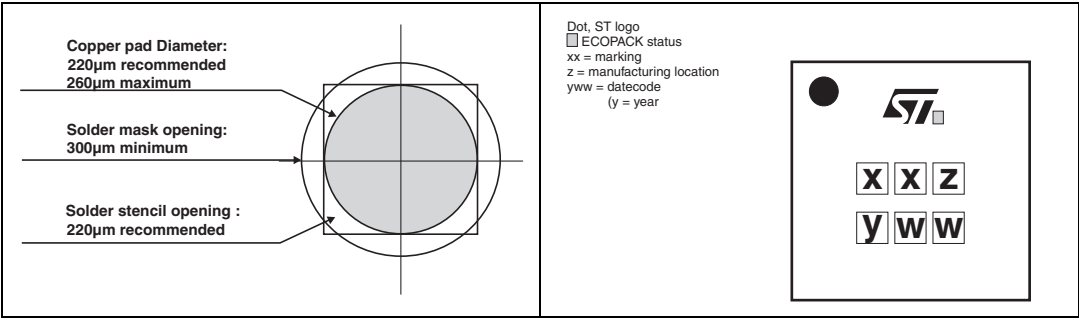
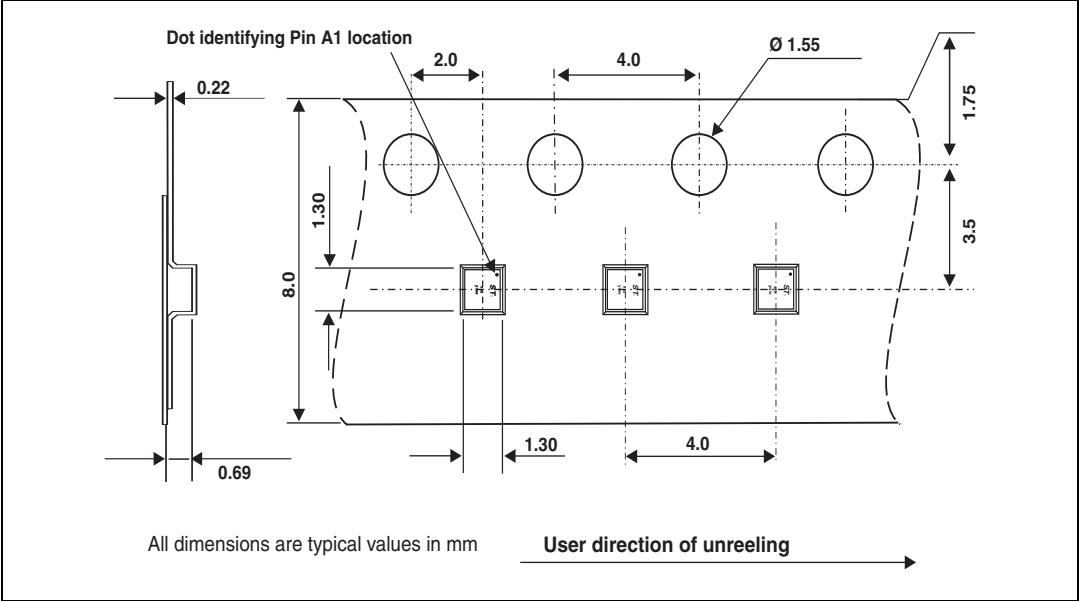


Figure 15. Flip Chip tape and reel specification



4 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-MIC06F3	JB	Flip Chip	1.8 mg	5000	Tape and reel 7"

Note:

More information is available in the application notes
AN2348: "Flip Chip: Package description and recommendations for use"
AN1751: "EMI Filters: Recommendations and measurements"

5 Revision history

Table 4. Document revision history

Date	Revision	Changes
21-Nov-2008	1	Initial release
05-Mar-2009	2	Updated <i>Figure 4</i> and <i>Figure 12</i> .
07-Apr-2010	3	Updated tolerance <i>Figure 12</i> .
23-Sep-2011	4	Added <i>ECI pin connection on page 2</i> .

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